

## PATENT COOPERATION TREATY

## PCT

## INTERNATIONAL SEARCH REPORT

(PCT Article 18 and Rules 43 and 44)

Applicant's or agent's file reference GLOZ200136 PCT	<b>FOR FURTHER ACTION</b> see Form PCT/ISA/220 as well as, where applicable, item 5 below.	
International application No. PCT/US2004/021712	International filing date (day/month/year) 07/07/2004	(Earliest) Priority Date (day/month/year) 07/07/2003
Applicant  GELCORE LLC		

This International Search Report has been prepared by this International Searching Authority and is transmitted to the applicant according to Article 18. A copy is being transmitted to the International Bureau.

This International Search Report consists of a total of 6 sheets.



It is also accompanied by a copy of each prior art document cited in this report.

1. **Basis of the report**

- a. With regard to the **language**, the international search was carried out on the basis of the international application in the language in which it was filed, unless otherwise indicated under this item.



The international search was carried out on the basis of a translation of the international application furnished to this Authority (Rule 23.1(b)).



- b. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, see Box No. I.

2.



**Certain claims were found unsearchable** (See Box II).

3.



**Unity of invention is lacking** (see Box III).

4. With regard to the **title**,



the text is approved as submitted by the applicant.



the text has been established by this Authority to read as follows:

5. With regard to the **abstract**,



the text is approved as submitted by the applicant.



the text has been established, according to Rule 38.2(b), by this Authority as it appears in Box No. IV. The applicant may, within one month from the date of mailing of this international search report, submit comments to this Authority.

6. With regard to the **drawings**,

- a. the figure of the **drawings** to be published with the abstract is Figure No. 1



as suggested by the applicant.



as selected by this Authority, because the applicant failed to suggest a figure.



as selected by this Authority, because this figure better characterizes the invention.



- b. none of the figures is to be published with the abstract.

# INTERNATIONAL SEARCH REPORT

International application No.  
PCT/US2004/021712

## Box II Observations where certain claims were found unsearchable (Continuation of item 2 of first sheet)

This International Search Report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☐ Claims Nos.:  
because they relate to subject matter not required to be searched by this Authority, namely:
2. ☐ Claims Nos.:  
because they relate to parts of the International Application that do not comply with the prescribed requirements to such an extent that no meaningful International Search can be carried out, specifically:
3. ☐ Claims Nos.:  
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

## Box III Observations where unity of invention is lacking (Continuation of item 3 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

see additional sheet

1. ☐ As all required additional search fees were timely paid by the applicant, this International Search Report covers all searchable claims.
2. ☐ As all searchable claims could be searched without effort justifying an additional fee, this Authority did not invite payment of any additional fee.
3. ☐ As only some of the required additional search fees were timely paid by the applicant, this International Search Report covers only those claims for which fees were paid, specifically claims Nos.:
4. ☒ No required additional search fees were timely paid by the applicant. Consequently, this International Search Report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

1-9, 20-26, 33

Remark on Protest

☐ The additional search fees were accompanied by the applicant's protest.

☐ No protest accompanied the payment of additional search fees.

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

This International Searching Authority found multiple (groups of) inventions in this international application, as follows:

1. claims: 1-9, 20-26, 33

directed to flip-chip connection bumps containing nanotubes  
thus enhancing the connection between a chip and a  
heat-sinking support structure  
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2. claims: 10-19, 27-32

directed to a heat-sinking support structure containing  
nanotubes provided in laterally arranged channels to enhance  
the lateral spreading of heat within the heat-sinking  
support structure  
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## INTERNATIONAL SEARCH REPORT

International Application No

PCT/US2004/021712

## A. CLASSIFICATION OF SUBJECT MATTER

IPC 7 H01L23/373 H01L23/485

According to International Patent Classification (IPC) or to both national classification and IPC

## B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 7 H01L

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal, WPI Data

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 2003/117770 A1 (MONTGOMERY STEPHEN W ET AL) 26 June 2003 (2003-06-26) abstract; figures 1,3,4 -----	1,20
Y	WO 02/099845 A (INFINEON TECHNOLOGIES AG; HOENLEIN, WOLFGANG; KLOSE, HELMUT; KREUPL, F) 12 December 2002 (2002-12-12) page 5, line 33 - page 8, line 29; figures 3-6 -----	1-3,5-8, 20-22, 26,33
Y	US 2002/190260 A1 (SHEN YU-CHEN ET AL) 19 December 2002 (2002-12-19)  paragraph [0050]; figure 6b -----	1-3,5-8, 20-22, 26,33
X	DE 198 32 970 A1 (SIEMENS AG) 4 November 1999 (1999-11-04) the whole document ----- -/--	9,23



Further documents are listed in the continuation of box C.



Patent family members are listed in annex.

## \* Special categories of cited documents :

- "A" document defining the general state of the art which is not considered to be of particular relevance
- "E" earlier document but published on or after the international filing date
- "L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
- "O" document referring to an oral disclosure, use, exhibition or other means
- "P" document published prior to the international filing date but later than the priority date claimed

- "T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
- "X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
- "Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.
- "&" document member of the same patent family

Date of the actual completion of the international search

13 July 2005

Date of mailing of the international search report

20.09.05

Name and mailing address of the ISA

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Dauw, X

## INTERNATIONAL SEARCH REPORT

International Application No

PCT/US2004/021712

## C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
P,X	US 2004/108589 A1 (HEILBRONNER HEINRICH) 10 June 2004 (2004-06-10) abstract; figures 1,2 -----	1,20
A	DE 101 03 340 A1 (INFINEON TECHNOLOGIES AG) 22 August 2002 (2002-08-22) abstract; figure 1 -----	1-9, 20-26,33
A	US 6 407 922 B1 (ECKBLAD MICHAEL Z ET AL) 18 June 2002 (2002-06-18) abstract; figures 1,2 -----	1-9, 20-26,33

# INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

PCT/US2004/021712

Patent document cited in search report		Publication date	Patent family member(s)	Publication date
US 2003117770	A1	26-06-2003	AU 2002353167 A1	09-07-2003
			CN 1623230 A	01-06-2005
			EP 1329953 A1	23-07-2003
			JP 2003249613 A	05-09-2003
			WO 03054958 A1	03-07-2003
-----				
WO 02099845	A	12-12-2002	DE 10127351 A1	19-12-2002
			EP 1393370 A2	03-03-2004
			JP 2004528727 T	16-09-2004
			US 2004233649 A1	25-11-2004
-----				
US 2002190260	A1	19-12-2002	NONE	
-----				
DE 19832970	A1	04-11-1999	NONE	
-----				
US 2004108589	A1	10-06-2004	DE 10248644 A1	06-05-2004
			EP 1411549 A1	21-04-2004
			JP 2004140356 A	13-05-2004
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DE 10103340	A1	22-08-2002	WO 02059392 A1	01-08-2002
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US 6407922	B1	18-06-2002	NONE	
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